

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (currently amended) A watermark insertion apparatus comprising:
 - a watermark generation section that generates in a program a watermark that differs for each of a plurality of distribution destinations of said program;
 - a first assignment expression embedding section that defines a plurality of functions that ~~output a plurality of input the watermark and output predetermined constants, respectively, from~~ for each distribution destination, said watermark plurality of functions and said predetermined constants being associated in a one to one correspondence, and embeds in said program the watermark and a plurality of expressions that assign each of said plurality of functions to one of a plurality of variables, respectively said plurality of functions and said plurality of variables being associated in a one to one correspondence;
 - a code insertion section that sets as a watermark verification code a decision statement of a conditional branch for deciding whether each of said plurality of variables and each of said plurality of constants are equal, and halting said program if each of said plurality of variables and each of said plurality of constants are not equal, and that inserts in said program said watermark verification code which, if said watermark or said watermark verification code is tampered, does not operate said program properly and which comprises same content regardless of said plurality of distribution destinations;
 - a second assignment expression embedding section that generates another function that outputs another constant such that a sum of said another constant and a sum of said plurality of constants is zero and embeds in said program an expression that assigns said another function to another variable; and
 - an addition section that generates and inserts as [[a]] said verification code a code that adds a total value of said another variable and said sum of said plurality of variables to said

decision statement of said conditional branching in said program such that said decision statement of said program of a decision branch is not affected if said watermark and the watermark verification code are not tampered.

2. (original) The watermark insertion apparatus according to claim 1, wherein said watermark is generated from ID information that uniquely determines a program distribution destination.

3. (original) The watermark insertion apparatus according to claim 1, further comprising a function insertion section that defines a function that outputs a predetermined constant from said watermark and inserts an expression that assigns said function to a variable in said program; wherein said watermark verification code is a conditional branch that determines whether said variable and said constant are equal, and when said variable and said constant are not equal halts said program; and said watermark verification code is made identical regardless of said distribution destination.

4. (original) The watermark insertion apparatus according to claim 1, wherein said watermark verification code is necessary for said program to be made to operate correctly.

5. (original) The watermark insertion apparatus according to claim 4, wherein said watermark verification code has inserted a calculation expression that does not affect a decision statement of a decision branch generated from said watermark in said decision branch extracted from said program.

6. (original) A watermark extraction apparatus comprising:
a program input section that inputs a program in which the watermark insertion apparatus **according to claim 1** has inserted said watermark and said watermark verification code; and

a watermark detection section that extracts said watermark from said program and generates ID information that uniquely identifies said distribution destination based on said watermark;

wherein a distribution destination is identified based on generated said ID information.

7. (currently amended) A program illegal distribution prevention system comprising
[[:]] a watermark insertion apparatus [[:]] and a watermark extraction apparatus, wherein:

said watermark insertion apparatus comprises:

a watermark generation section that generates a watermark that differs for each of a plurality of distribution destinations destination of a program;

a first assignment expression embedding section that defines a plurality of functions that ~~output a plurality of input the watermark and output predetermined constants, respectively, from~~ for each distribution destination, said watermark plurality of functions and said predetermined constants being associated in a one to one correspondence, and embeds in said program the watermark and a plurality of expressions that assign each of said plurality of functions to one of a plurality of variables, respectively said plurality of functions and said plurality of variables being associated in a one to one correspondence;

a code insertion section that sets as a watermark verification code a decision statement of a conditional branch for deciding whether each of said plurality of variables and each of said plurality of constants are equal, and halting said program if each of said plurality of variables and each of said plurality of constants are not equal, and that inserts in said program said watermark verification code which, if said watermark or said watermark verification code is tampered, does not operate said program properly and which comprises same content regardless of said plurality of distribution destinations;

a second assignment expression embedding section that generates another function that outputs another constant such that a sum of said another constant and a sum of said plurality of constants is zero and embeds in said program an expression that assigns said another function to another variable; and

an addition section that generates and inserts as [[a]] said verification code a code that adds a total value of the another variable and said sum of said plurality of variables to said decision statement of said conditional branching in said program such that said decision statement of said program of a decision branch is not affected if said watermark and the watermark verification code are not tampered; and

said watermark extraction apparatus comprises:

a program input section that inputs a program in which the watermark insertion apparatus has inserted said watermark and said watermark verification code; and

a watermark detection section that extracts said watermark from said program and generates ID information that uniquely identifies said distribution destination based on said watermark; and

a distribution destination is identified based on said generated said ID information in said watermark extraction apparatus.

8. (original) The program illegal distribution prevention system according to claim 7, wherein said watermark insertion apparatus is provided at said distribution destination.

9.- (currently amended) A watermark insertion method wherein:
generating a watermark that differs for each program of a plurality of distribution destination ~~is inserted in said~~ of a program ~~and said watermark is used;~~

defining a plurality of functions that input the watermark and output a plurality of predetermined constants, ~~respectively, from~~ for each distribution destination, said watermark plurality of functions and said predetermined constants being associated in a one to one

correspondence, and embedding in said program the watermark and a plurality of expressions that assign each of said plurality of functions to one of a plurality of variables, respectively said plurality of functions and said plurality of variables being associated in a one to one correspondence;

setting as a watermark verification code a decision statement of a conditional branch for deciding whether each of said plurality of variables and each of said plurality of constants are equal, and halting said program if each of said plurality of variables and each of said plurality of constants are not equal, and inserting in said program [[a]] said watermark verification code which, if said watermark or said watermark verification code is tampered, does not operate said program properly and which comprises same content regardless of said plurality of distributions destinations;

generating another function that outputs another constant such that a sum of said another constant and a sum of said plurality of constants is zero and embedding in said program an expression that assigns said another function to another variable; and

generating and inserting as [[a]] said verification code a code that adds a total value of said another variable and said sum of said plurality of variables to said decision statement of said conditional branching in said program such that said decision statement of said program of a decision branch is not affected if said watermark and the watermark verification code are not tampered.

10. (previously presented) A watermark insertion method according to claim 9, comprising:

inserting in said program said watermark that differs for each program distribution destination; and

converting a periphery of an insertion location of said watermark or said entire program while maintaining specifications of said program.

11. (cancelled)
12. (previously presented) A watermark insertion apparatus according to claim 1, comprising:
 - a watermark insertion section that inserts in said program said watermark that differs for each program distribution destination; and
 - a conversion section that converts a part other than a location at which said watermark is inserted while maintaining specifications of said program.
13. (original) The watermark insertion apparatus according to claim 12, wherein said conversion section inserts an execution code pair that does not affect specifications in a part other than a location at which said watermark is inserted.
14. (original) The watermark insertion apparatus according to claim 12, wherein identification information is stored that indicates an insertion location of said watermark.
15. (original) The watermark insertion apparatus according to claim 14, wherein said identification information is a method name or line number.
16. (original) The watermark insertion apparatus according to claim 12, wherein said conversion section performs obfuscating so that specifications are not affected in a part other than a location at which said watermark is inserted.
17. (currently amended) A watermark extraction apparatus comprising:
 - a program input section that inputs a program in which the watermark insertion apparatus comprises:

a watermark insertion section that inserts in a program a watermark that differs for each of a plurality of distribution destinations of said program;

a first assignment expression embedding section that defines a plurality of functions that ~~output a plurality of input the watermark and output predetermined constants, respectively, from~~ for each distribution destination, said watermark plurality of functions and said predetermined constants being associated in a one to one correspondence, and embeds in said program the watermark and a plurality of expressions that assign each of said plurality of functions to one of a plurality of variables, respectively said plurality of functions and said plurality of variables being associated in a one to one correspondence;

a code insertion section that sets as a watermark verification code a decision statement of a conditional branch for deciding whether each of said plurality of variables and each of said plurality of constants are equal, and halting said program if each of a plurality of variables are not equal, and that inserts in said program said watermark verification code which, if said watermark or said watermark verification code is tampered, does not operate said program properly and which comprises same content regardless of said plurality of distribution destinations;

a second assignment expression embedding section that generates another function that outputs another constant such that a sum of said another constant and a sum of said plurality of constants is zero $[[.]]$ and embeds in said program an expression that assigns said another function to another variable;

an addition section that generates and inserts and inserts as $[[a]]$ said verification code a code that adds a total value of said another variable and said sum of said plurality of variables to said decision statement of said conditional branching in said program such that said decision statement of said program of a decision branch is not affected if said watermark and the watermark verification code are not tampered

a watermark insertion section that inserts in said program said watermark that differs for each program distribution destination; and

a conversion section that converts a part other than a location at which said watermark is inserted while maintaining specifications of said program; and

a watermark detection section that extracts said watermark from said program; wherein a distribution destination is identified based on extracted said watermark.

18. (currently amended) A watermark extraction apparatus comprising:

a program input section that inputs a program in which the watermark insertion apparatus comprises:

a watermark insertion section that inserts in a program a watermark that differs for each of a plurality of distribution destinations of said program;

a first assignment expression embedding section that defines a plurality of functions that ~~output a plurality of input the watermark and output predetermined constants, respectively, from~~ for each distribution destination, said watermark plurality of functions and said predetermined constants being associated in a one to one correspondence, and embeds in said program the watermark and a plurality of expressions that assign each of said plurality of functions to one of a plurality of variables, respectively said plurality of functions and said plurality of variables being associated in a one to one correspondence;

a code insertion section that sets as a watermark verification code a decision statement of a conditional branch for deciding whether each of said plurality of variables and each of said plurality of constants are equal, and halting said program if each of a plurality of variables are not equal, and that inserts in said program said watermark verification code which, if said watermark or said watermark verification code is tampered, does not operate said program properly and which comprises same content regardless of said plurality of distribution destinations;

a second assignment expression embedding section that generates another function that outputs another constant such that a sum of said another constant and a sum of said plurality of constants is zero [[.]] and embeds in said program an expression that assigns said another function to another variable;

an addition section that generates and inserts and inserts as [[a]] said verification code a code that adds a total value of said another variable and said sum of said plurality of variables to said decision statement of said conditional branching in said program such that said decision statement of said program of a decision branch is not affected if said watermark and the watermark verification code are not tampered

a watermark insertion section that inserts in said program said watermark that differs for each program distribution destination; and

a conversion section that converts a part other than a location at which said watermark is inserted while maintaining specifications of said program; and

a watermark detection section that obtains said identification information, identifies a watermark insertion location from said identification information, and extracts said watermark from only identified said watermark insertion location; wherein a distribution destination is identified based on extracted said watermark, and wherein said identification information is a method name or line number.

19. (cancelled)

20. (currently amended) The watermark insertion apparatus according to claim 12, wherein said conversion section converts a sequence of a part that is a part other than a location at which said watermark is inserted and is a part that does not affect specifications even if said sequence is ~~switched around~~ changed.

21. (original) The watermark insertion apparatus according to claim 20, wherein historical information on a part that does not affect said specifications is held, and using said historical information, conversion of a part that does not affect said specifications is made to differ for each distribution destination.